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Western Larch

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U. S. DEPARTMENT OF AGRICULTURE

WESTERN LARCH

(*Larix occidentalis*)

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Western larch grows in a limited region in the northwestern part of the United States and in the southwestern part of Canada. It is a tall, straight tree, sometimes reaching a height of 200 feet, a diameter of 5 feet, and an age of over 400 years. The wood of western larch is quite similar in its strength properties to the Pacific coast type of Douglas-fir, but stronger and harder than that of the Rocky Mountain type. Western larch and Douglas-fir frequently occur together in the forest and are commonly logged together and sold in mixture [1] under the commercial name of "larch-fir."

Western larch is used largely as rough lumber in local building construction. In recent years there have been shipments of high-grade lumber suitable for flooring and interior finish to the Northeast and Middle West. The butt logs of western larch trees frequently contain large quantities of a gum known as galactan which increases their weight and darkens the color of the wood. The whole or a portion of these butt logs is often left in the woods either because they are too heavy to float or because they have too much shake [2] to make good lumber. The bark near the base of middle-aged trees is ordinarily from 3 to 6 inches thick, which gives them a high degree of fire resistance.

Nomenclature.—The name western larch is commonly used. Sometimes it is shortened to larch. Other names less frequently used are tamarack, western tamarack, hackmatack, mountain larch, and Montana larch.

Distribution and growth.—In the United States, western larch grows in mountain valleys and on slopes at elevations of from 2,000 to 7,000 feet in western Montana, northern Idaho, Washington, and Oregon (see fig. 1). It reaches its best development and greatest commercial importance in northern Idaho and western Montana, where it sometimes forms pure forests of limited extent, although generally associated with other species. The average size of mature western larch trees varies from 100 feet in height and 13 inches in diameter in the less favorable situations to 175 feet in height and 3 feet in diameter in the better situations. Under favorable conditions western larch reaches a diameter of 16 inches in about 80 years. Abundant moisture is required for the germination of the seed and for the best development of the tree. Western larch is intolerant of shade throughout its life, and only those trees survive that grow rapidly enough when young to overtop competing species. The fastest height growth generally occurs between the tenth and thirtieth years.

[1] This mixture generally contains about 60 percent of western larch and about 40 percent of Douglas-fir.

[2] Shake is a separation between the annual rings.

Supply.—The stand of western larch of saw-timber size in the United States was estimated in 1932 at 26,118,000,000 board feet.[3] Of this amount about one-half was placed in Montana, one-quarter in Idaho, and the rest in Oregon and Washington. A recent forest survey showed a stand of western larch saw timber of approximately 23,740,000,000 board feet. The greater part of this stand lies within the boundaries of the national forests. It is distributed as follows:

Region:	*Stand in board feet, lumber tally*
Western Washington	[1] 30, 500, 000
Eastern Washington	[2] 4, 609, 100, 000
Western Oregon	[1] 115, 200, 000
Eastern Oregon	[3] 3, 498, 100, 000
Western Montana	[4] 10, 530, 300, 000
Northern Idaho	[5] 4, 952, 200, 000
Total stand in United States	23, 735, 400, 000

[1] Andrews, H. V., and Cowlin, R. W. Forest resources of the Douglas-fir region. U. S. Dept. Agr. Misc. Pub. 389, 169 pp., illus. 1940.

[2] Cowlin, R. W., Briegleb, P. A., and Moravets, F. W. Forest resources of the ponderosa pine region. U. S. Dept. Agr. Misc. Pub. 490, 99 pp., illus. 1942. Also U. S. Forest Service, Northern Rocky Mountain Forest and Range Experiment Station. Forest statistics, pend oreille county, washington. Forest Survey Release 2, 24 pp., illus. 1937. [Processed.]; Forest statistics, spokane county, washington. Forest Survey Release 4, 24 pp., illus. 1937. [Processed.]; and Forest statistics, stevens county, washington. Forest Survey Release 5, 24 pp., illus. 1937. [Processed.]

[3] See U. S. Dept. Agr. Misc. Pub. 490 (footnote 2).

[4] U. S. Forest Service, Northern Rocky Mountain Forest and Range Experiment Station. Highlights of the forest situation in western montana. Forest Survey Statis. Serv. 14, pp. unnumbered, illus. 1943. [Processed.]

[5] U. S. Forest Service, Northern Rocky Mountain Forest and Range Experiment Station. Forest statistics for northern idaho. Forest Survey Statis. Serv. 10, pp. unnumbered, illus. 1941. [Processed.]

Production of lumber.—The cut of western larch lumber in 1899[4] was 42,394,000 board feet (see fig. 2). During the next 10 years it rose to 264,000,000 board feet (1909). For the 30-year period 1910–39 the cut varied from 338,700,000 board feet in 1920 (the all-time maximum) to 187,234,000 board feet in 1921. After 1929 the production of western larch lumber fell off markedly—dropping to 48,490,000 board feet in 1932 and to 45,353,000 board feet in 1933. By 1943 production had recovered to 226,483,000 feet. The average annual production for the 10-year period 1934–43 was 132,000,000 board feet. Montana has been the leading producing State since 1920. In previous years Idaho occasionally took first place. Washington has generally occupied third place. Oregon has produced comparatively little. In 1942 approximately 64 percent of the western larch lumber came from Montana and about 33 percent from Idaho and Washington combined.

Cross ties.—The average number of western larch cross ties[5] treated annually with wood preservatives in recent years (1939–42) was approximately 1,080,000.[6] If it is assumed that 90 percent of all western larch ties are treated and 10 percent are used without treatment, the total number used annually would be about 1,200,000. Of

[3] United States Forest Service. A national plan for american forestry. 73rd Cong., 1st sess., Senate Doc. 12, 2 v., 1,677 pp. 1933.

[4] The first year in which the amount of western larch cut for lumber was recorded separately from other species.

[5] Including also switch ties adjusted to their equivalent in cross ties.

[6] The statistics covering the quantity of wood treated with preservatives compiled annually by the U. S. Forest Service in cooperation with the American Wood-Preservers Association, group tamarack and western larch together under the name "tamarack." In 1939, 1940, 1941, and 1942, however, it is possible to separate the two species.

FIGURE 1.—Range of western larch (*Larix occidentalis*) in the United States.

FIGURE 2.—Lumber production of western larch (*Larix occidentalis*), 1899–1943.

this total, some were hewed and some were sawed.[7] It is estimated that approximately 25 percent, or 300,000 ties, were hewed, equivalent to 9,000,000 board feet.

In addition to the western larch used for lumber and hewed cross ties, indeterminate amounts are used for piling, poles, mine timbers, posts, fuel wood, etc. The average annual cut of western larch for all purposes in recent years is estimated roughly at 150,000,000 board feet.

Properties.—The heartwood of western larch is reddish brown and the sapwood yellowish white. The sapwood is narrow—generally not over 1 inch thick. The annual rings, as they show on a cross section of the wood, are made up of distinct bands of light-colored springwood and darker-colored summerwood. The rings are generally quite uniform in width and commonly run from 15 to 30 to the radial inch. The wood is moderately strong, stiff, moderately heavy,[8] moderately hard, and moderately high in shock-resisting ability. It shrinks more in drying than do any of the principal softwoods but less than many of the heavier commercially important hardwoods. The wood finishes well in its natural color and also takes stains readily. Western larch and Douglas-fir have about the same paint-holding ability and in this respect rank below the lighter softwoods in which there is less distinction between the summerwood and springwood. The wood of western larch is usually straight-grained. It splits easily and is subject to ring shake. Western larch has about the same durability as Douglas-fir and ranks between the woods high in durability, such as the cedars and redwood, and those of low durability, such as aspen and white fir. Knots are common, but are generally small and tight. Western larch (heartwood) is rated as difficult to treat with a preservative such as creosote. In ability to take treatment it is classed with white fir and Engelmann spruce and is somewhat easier to treat than Douglas-fir (mountain type). The lumber presents certain seasoning difficulties because of the slowness with which it gives up its moisture and the tendency of wide boards to split. With proper piling, however, and proper drying schedules it can be seasoned satisfactorily. Western larch ranks high in nail-holding ability, but on account of the tendency of the wood to split it is preferable to use blunt-pointed or smaller nails than are used with woods that are softer or more uniform in texture.

On account of its dark color, gum content, and comparative hardness, western larch is not as well adapted to the manufacture of paper pulp as a number of woods which grow in quantity in the same region, such as the spruces, true firs, and western hemlock. It can, however, be readily reduced by the sulfate process[9] to yield

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[7] Sawed ties are classed as lumber and are included in the statistics for lumber production.

[8] The average weight of western larch in an air-dry condition (12 percent moisture) is 36 pounds per cubic foot.

[9] Six processes are used commercially in making paper pulp from wood. One is the mechanical or ground-wood process, in which the wood is reduced to pulp on a grindstone. The yield approaches 100 percent of the weight of the wood. Four are chemical processes—the sulfite, sulfate, soda, and neutral sulfite. They depend upon the dissolving action of chemical reagents which remove essentially all of the binding material (lignin) surrounding the cellulose fibers and leave them in a fairly pure state. The removal of the lignin is accomplished by cooking the wood chips with the proper chemical under steam pressure. The yield of pulp is about one-half the weight of the wood. In a sixth process, the semichemical, part of the lignin is removed by chemical means, and the resultant pulp, containing some lignin, is further refined by mechanical means. The yield of semichemical pulp is intermediate between the yields obtained with the mechanical process and the chemical processes.

a strong pulp suitable for the manufacture of fiberboard and good quality kraft wrapping paper.

The gum (galactan) found in the wood of western larch, when extracted with water, yields from 8 to 25 percent of the weight of the dry wood. The galactan can be hydrolyzed to form a sugar called galactose, and this in turn can be oxidized to mucic acid which has been used commercially in place of tartaric acid in the manufacture of baking powder and for several other purposes.

Table 1 shows the amounts of western larch used in the manufacture of various products in 1912, 1928, 1933, and 1940. It includes western larch in the form of lumber with a very small proportion of logs and bolts.

As a raw material for the production of ethyl alcohol, western larch has an advantage over other woods, as both the wood and the gum yield sugars that can be fermented into alcohol with a comparatively high combined yield.

Principal uses.—Western larch is used principally in building construction in the form of rough dimension, small timbers, planks, and boards; and for ties and mine timbers. A large proportion of the cut of lumber (probably at least 75 percent) is used for structural purposes as it comes from the sawmill. Some of the higher-grade material is further manufactured into interior finish, flooring, sash, doors, blinds, and other products.

For interior finish western larch has been in increasing demand on account of its handsome but subdued figure and ease of finishing. For edge-grain flooring it is quite satisfactory because of its hardness and narrow annual rings. Flat-grain flooring of western larch is liable to be unsatisfactory where subjected to heavy wear because of the tendency of the wood to separate between the annual rings.

Western larch cross ties are commonly given a preservative treatment with creosote or zinc chloride. For fuel purposes the wood is rated high as compared to other species available in the same region. Other uses include piling, poles, and posts.

TABLE I.—*Western larch used in the manufacture of wooden products*

[Thousands of board feet]

Classes of products	1912	1928	1933	1940
Agricultural implements				11
Boxes, baskets, and crating	344	4, 382	168	517
Car construction and repair	323	3, 073	231	123
Electrical equipment		1, 547		
Fixtures		60		27
Flooring	(1)	(1)		2, 042
Furniture	4	327	25	356
Sash, doors, general millwork	[2] 55, 528	[2] 23, 784	[3] 706	[3] 1, 141
Ship and boat building	15			2
Tanks	450			
Woodenware and novelties				481
Total	56, 664	33, 173	1, 130	4, 700

[1] Included in "Sash, doors, general millwork."
[2] Includes planing-mill products such as siding, ceiling, and flooring.
[3] Planing-mill products not included in 1933 and 1940 canvasses as in 1912 and 1928 except flooring which is listed separately.

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